What is claimed is:

1. A semiconductor light emitting device comprising:

a substrate, and

a light emitting layer forming portion disposed on said substrate so that an active layer that emits light by electric current injection is sandwiched between n-type and p-type cladding layers made of materials having a larger band gap than said active layer,

wherein said active layer is made of an oxide compound semiconductor containing at least one of Cd and Zn.

2. The semiconductor light emitting device of claim 1, wherein said cladding layers are made of ZnO-based oxide compound semiconductor.

3. The semiconductor light emitting device of claim 1, wherein said cladding layers are made of Group III nitride compound semiconductor.

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~~4. The semiconductor light emitting device of claim 1, 2 or 3, wherein said active layer is made of $Cd_xZn_{1-x}O$ ($0 \leq x < 1$).~~

5. A semiconductor light emitting device comprising:

an active layer that emits light by electric current injection, and

cladding layers made of materials having a larger band gap than said active layer, said cladding layers sandwiching said active layer from both sides thereof,

wherein said cladding layers are made of oxide compound semiconductor containing Zn or Mg and Zn.

6. The semiconductor light emitting device of claim 5, wherein said cladding layers are made of $Mg_yZn_{1-y}O$ ($0 \le y < 1$).

7. The semiconductor light emitting device of claim 1, 2, 3, 4, 5 or 6, wherein the substrate on which said cladding layers and said active layer are laminated is one kind selected from the group consisting of GaN, Si having SiC formed thereon, single crystal SiC, and sapphire.

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8. The semiconductor light emitting device of claim 1, 2, 3, 4, 5, 6 or 7, wherein said active layer is a single quantum well structure or a multiple quantum well structure.

9. A semiconductor laser comprising:

an active layer that emits light by electric current injection, and

n-type and p-type cladding layers made of materials having a larger band gap than said active layer and sandwiching said active layer from both sides thereof,

wherein said active layer is made of $Cd_xZn_{1-x}O$ ($0 \le x < 1$), said cladding layers are made of $Mg_yZn_{1-y}O$ ($0 \le y < 1$), and an internal electric current constriction layer is built therein.

10. A method of narrowing a band gap of a ZnO compound semiconductor by forming a solid solution of CdO and ZnO to make a mixed crystal having a general formula represented by $Cd_xZn_{1-x}O$ ($0 \le x < 1$) to reduce the band gap of ZnO.

11. The semiconductor light emitting device of claim 1, wherein said active layer is made of a bulk layer of $Cd_xZn_{1-x}O$ ($0 \le x < 1$) or a quantum well structure constructed

with a composition modification of $Cd_xZn_{1-x}O$ ($0 \leq x < 1$), and a stress-alleviating layer is disposed on at least one side of said n-type cladding layer side and said p-type cladding layer side of said active layer so as to be in contact with said active layer, said stress-alleviating layer being made of a material having a larger band gap than said active layer and having a composition with approximately the same lattice constant as a material of the composition located on the outermost side of said active layer on said at least one side.

12. The semiconductor light emitting device of claim 11, wherein said stress-alleviating layer is made of $Mg_wZn_{1-w}O$ ($0 \leq w < 1$), and said cladding layers are made of oxide compound semiconductor containing Mg and Zn.

13. A semiconductor laser comprising:

an active layer that emits light by electric current injection, and

n-type and p-type cladding layers made of materials having a larger band gap than said active layer and sandwiching said active layer from both sides thereof,

wherein said active layer is made of a quantum well structure constructed with a composition modification of $Cd_xZn_{1-x}O$ ($0 \leq x < 1$), and a stress-alleviating layer is disposed on at least one side of said n-type cladding layer side and said p-type cladding layer side of said active layer so as to be in contact with said active layer, said stress-alleviating layer being made of $Mg_wZn_{1-w}O$ ($0 \leq w < 1$) having a

composition with approximately the same lattice constant as the composition located on the outermost side of said active layer on said at least one side.

14. The semiconductor laser of claim 13, wherein said cladding layers are made of $Mg_yZn_{1-y}O$ ($0\leq y<1$), and an optical wave guide layer is disposed between said stress-alleviating layer and said n-type or p-type cladding layer.

15. The semiconductor light emitting device of claim 4, wherein a low-temperature ZnO layer is disposed at least on said active layer side between said active layer and an upper cladding layer.

16. The semiconductor light emitting device of claim 15, wherein said low-temperature ZnO layer is disposed to have a thickness from 100 to 1000 Å.

17. A method of manufacturing a ZnO-based compound semiconductor light emitting device in which an active layer made of a ZnO-based compound semiconductor containing Cd is sandwiched between cladding layers made of ZnO-based compound semiconductor, comprising the steps of

growing said active layer made of said ZnO-based compound semiconductor containing Cd,

growing a Cd-evaporation-preventing layer made of ZnO at approximately the same low temperature as the growth temperature of said active layer, and

growing a ZnO-based compound semiconductor layer at a high temperature.

18. A semiconductor light emitting device comprising:

a sapphire substrate,

a buffer layer made of an Al_2O_3 film disposed on said sapphire substrate, and

a light emitting layer forming portion made of ZnO-based compound semiconductor disposed on said buffer layer, said light emitting layer forming portion including at least n-type and p-type layers to form a light emitting layer.

19. The semiconductor light emitting device of claim 18, wherein said light emitting layer forming portion has a double heterojunction structure in which an active layer made of $Cd_xZn_{1-x}O$ ($0 \leq x < 1$) is sandwiched between n-type and p-type cladding layers made of $Mg_yZn_{1-y}O$ ($0 \leq y < 1$).

20. A method of manufacturing a semiconductor light emitting device comprising the steps of:

depositing an Al_2O_3 film at a low temperature on a sapphire substrate,

raising the temperature of said sapphire substrate to a temperature such that single crystals can be grown, and

growing a light emitting layer forming portion which is made of ZnO-based compound semiconductor and comprises a first conductivity type layer and a second conductivity type layer to form a light emitting layer.

21. A semiconductor light emitting device comprising:

a substrate, and

a semiconductor laminate section disposed on said

substrate and made of oxide compound semiconductor layers and including a light emitting layer forming portion,

wherein an oxide thin film containing Zn is disposed as a buffer layer on a front surface of said substrate at a lower temperature than a temperature of growing semiconductor layers of said semiconductor laminate section and is interposed between said substrate and said semiconductor laminate section.

22. The semiconductor light emitting device of claim 21, wherein said buffer layer is formed to have a thickness of 20 to 200 nm by an MBE method, an MOCVD method, or a plasma CVD method between 100 and 300℃.

23. A method of manufacturing a semiconductor light emitting device comprising the steps of:

forming a non-crystalline or polycrystalline oxide thin film containing Zn on a substrate by a sputtering method, a vacuum vapor deposition method, or a laser ablation method,

putting said substrate into an apparatus for epitaxial growth of semiconductor layers and raising a substrate temperature to a growth temperature, and

laminating an oxide compound semiconductor layer to form a light emitting layer forming portion.

24. A semiconductor light emitting device comprising:

a substrate, and

a semiconductor laminate section including a light emitting layer forming portion made of compound

semiconductor layers disposed on said substrate and having n-type and p-type layers to form a light emitting layer,

wherein a buffer layer is disposed between said substrate and said semiconductor laminate section, said buffer layer being made of a material having a thermal expansion coefficient larger than the thermal expansion coefficient of an epitaxial growth layer at the lowermost layer of said semiconductor laminate section and smaller than the thermal expansion coefficient of said substrate.

25. The semiconductor light emitting device of claim 24, wherein said substrate is made of a sapphire substrate; wherein the epitaxial growth layer of said lowermost layer is made of a ZnO-based compound semiconductor; and wherein said buffer layer is a compound semiconductor having a wurtzite structure.

26. The semiconductor light emitting device of claim 25, wherein said buffer layer is made of $Al_pGa_{1-p}N$ ($0 \le p < 1$).

27. A semiconductor light emitting device comprising:

a substrate,

a reflective film for reflecting light from a front surface side of said substrate, and

a semiconductor laminate section,

wherein said reflective film is laminated by an even number of dielectric films or semiconductor films having different refractive indices with a thickness of $\lambda/(4n)$ (n is a refractive index of the dielectric film or the semiconductor film, and λ is a light emission wavelength)

on said substrate so that a layer having a smaller refractive index and a layer having a larger refractive index are alternately laminated in this order; and

wherein, in said semiconductor laminate section, semiconductor layers are laminated on said reflective film to form a light emitting layer.

28. The semiconductor light emitting device of claim 27, wherein a buffer layer made of oxide containing Zn and formed at a low temperature is disposed on said reflective film; and wherein said semiconductor laminate section is formed by lamination of oxide compound semiconductor on said buffer layer.

29. The semiconductor light emitting device of claim 28, wherein said buffer layer is formed by forming a non-crystalline or polycrystalline oxide thin film containing Zn by a sputtering method, a vacuum vapor deposition method, or a laser ablation method, and said semiconductor laminate section is formed by lamination of a ZnO-based compound semiconductor on said buffer layer.

30. A ZnO-based compound semiconductor light emitting device comprising:

a substrate; and

a light emitting layer forming portion disposed on said substrate and forming a light emitting layer by lamination of ZnO-based compound semiconductor having at least an n-type layer, wherein an n-side electrode disposed in contact with said n-type layer of said ZnO-based compound

semiconductor is formed so that a portion of said n-side electrode which is in contact with said n-type layer is formed of Ti or Cr, said portion not containing Al.

31. The semiconductor light emitting device of claim 30, wherein a layer containing Ti and Al is disposed on said layer of Ti or Cr.

32. The semiconductor light emitting device of claim 31, wherein said Ti and Al are formed into an alloy by an annealing treatment after said layer containing Ti and Al is formed.

33. A method of growing a p-type ZnO-based compound semiconductor wherein a ZnO-based compound semiconductor is epitaxially grown by introducing a Group IA element as a p-type dopant while introducing a Group VIIB element as a buffering agent in epitaxially growing the ZnO-based compound semiconductor.

34. The growth method of claim 33, wherein at least one kind of element selected from the group consisting of Li, Na, K, and Rb is used as said Group IA element; and wherein at least one kind of element selected from the group consisting of F, Cl, Br, and I is used as said Group VIIB element.

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~~35. The growth method of claim 33 or 34, wherein the molar number of said introduced Group IA element is larger than the molar number of said Group VIIB element.~~

36. A method of growing a p-type ZnO-based compound semiconductor wherein a ZnO-based compound semiconductor

is epitaxially grown by introducing a Group VB element as a p-type dopant while introducing a Group IIIB element as a buffering agent in epitaxially growing said ZnO-based compound semiconductor.

37. The growth method of claim 36, wherein at least one kind of an element selected from the group consisting of N, P, As, and Sb is used as said Group VB element, and wherein at least one kind of an element selected from the group consisting of B, Al, Ga, In, and Tl is used as said Group IIIB element.

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~~38. The growth method of claim 36 or 37, wherein the molar number of said introduced Group VB element is larger than the molar number of said Group IIIB element.~~

39. A semiconductor light emitting device comprising:

a substrate, and

a light emitting layer forming portion made of ZnO-based compound semiconductor layers disposed on said substrate and forming a light emitting layer with an n-type layer and a p-type layer, wherein said p-type layer contains an element capable of becoming an n-type dopant as a buffering agent.

40. A method of growing a p-type compound semiconductor by vapor deposition in which a p-type compound semiconductor layer is epitaxially grown by an MOCVD method, wherein said p-type compound semiconductor layer is formed by alternately repeating a step of growing a thin film of compound semiconductor layer by introducing a reaction gas

for said p-type compound semiconductor layer into a growth apparatus and a step of carrying out a doping process by introducing a p-type dopant gas.

41. A growth method of claim 40, wherein said reaction gas for growing said thin film is purged after the step of growing said thin film of compound semiconductor layer; and thereafter said dopant gas is introduced for carrying out said doping process.

42. The growth method of claim 40 or 41, wherein only an organic metal material is used as the reaction gas for growing said semiconductor layer.

43. The growth method of claim 41, wherein nitrogen or a rare gas of Group 0 is introduced into said growth apparatus for purging said reaction gas.

44. A method of growing a compound semiconductor by vapor deposition in which a p-type compound semiconductor layer is epitaxially grown by an MOCVD method, wherein, as a p-type dopant gas, a material having a structure such that elements of said dopant are not directly bonded to hydrogen atoms is used.

45. A method of growing single crystals of an oxide compound semiconductor in which said single crystals of said oxide compound semiconductor are grown on a substrate by introducing a dopant element and oxygen in a plasma state, wherein said single crystals of said oxide compound semiconductor are grown while removing or deviating charged particles generated in said plasma so that said charged

particles will not be radiated directly onto said substrate.

46. The method of claim 45, wherein removal or deviation of said charged particles is carried out by applying an electric field and/or a magnetic field, and

wherein crystals of a ZnO-based compound semiconductor are grown as said oxide compound semiconductor.

47. An apparatus for growing a compound semiconductor comprising:

a main chamber,

a substrate holder disposed in said main chamber,

a cell group disposed to be capable of radiating elements constituting the compound semiconductor towards a substrate held by said substrate holder, and

a plasma source for radiating a plasma,

wherein an electromagnetic field applying apparatus for applying an electric field and/or a magnetic field is disposed at least at a radiation outlet for radiating said plasma of said plasma source.

48. A ZnO-based compound semiconductor light emitting device comprising:

a substrate, and

a light emitting layer forming portion that forms a light emitting layer by lamination of a ZnO-based compound semiconductor layer disposed on said substrate,

wherein said ZnO-based compound semiconductor layer contains C element.

49. A semiconductor light emitting device of claim 48, wherein said C element is C of an organic metal compound used as a Zn material in growing said ZnO-based compound semiconductor layer.

50. A method of manufacturing a ZnO-based compound semiconductor light emitting device in which a ZnO-based compound semiconductor layer is laminated on a substrate to form a light emitting layer, wherein said ZnO-based compound semiconductor is epitaxially grown on said substrate by radiating an organic metal compound of Zn as a Zn material of said ZnO-based compound onto a front surface of said substrate for reaction on said substrate surface.

51. A semiconductor laser comprising:

a substrate, a first cladding layer disposed on said substrate and made of a first conductivity type semiconductor,

an active layer disposed on said first cladding layer,

a second cladding layer disposed on said active layer and made of a second conductivity type semiconductor, and

an electric current constriction layer disposed in the inside of or in the vicinity of said second cladding layer,

wherein said electric current constriction layer is made of a ZnO-based compound semiconductor doped with a Group IA or Group VB element.

52. A semiconductor laser of claim 51, wherein said first cladding layer, said active layer, and said second

cladding layer are made of ZnO-based or GaN-based compound semiconductor.

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~~53. The semiconductor laser of claim 51 or 52, wherein said electric current constriction layer is made of $Mg_zZn_{1-z}O$ ($0 \leq z < 1$).~~

54. A semiconductor laser comprising:

a substrate,

a first cladding layer disposed on said substrate and made of a first conductivity type semiconductor,

an active layer disposed on said first cladding layer,

a second cladding layer disposed on said active layer and made of a second conductivity type semiconductor, and

an electric current constriction layer disposed in the inside of or in the vicinity of said second cladding layer and made of $Mg_zZn_{1-z}O$ ($0 \leq z < 1$),

wherein an etching stopping layer made of $Cd_sZn_{1-s}O$ ($0 < s < 1$) or $Be_tZn_{1-t}O$ ($0 < t < 1$) is disposed on said substrate side of said electric current constriction layer.

55. A method of manufacturing a semiconductor laser comprising the steps of:

growing a first conductivity type cladding layer, an active layer, and a second conductivity type lower cladding layer made of ZnO-based compound semiconductor on a substrate,

growing an etching stopping layer made of $Cd_sZn_{1-s}O$ ($0 < s < 1$) and an insulating or first conductivity type electric current constriction layer made of $Mg_zZn_{1-z}O$ ($0 \leq z < 1$)

on said second conductivity type lower cladding layer,

etching said electric current constriction layer with an alkali solution to form an electric current injection region, and

growing a second conductivity type upper cladding layer made of a ZnO-based compound semiconductor.

56. A method of manufacturing a semiconductor laser comprising the steps of:

growing a first conductivity type cladding layer, an active layer, and a second conductivity type lower cladding layer made of ZnO-based compound semiconductor on a substrate,

growing an etching stopping layer made of $Be_tZn_{1-t}O$ ($0<t<1$) and an insulating or first conductivity type electric current constriction layer made of $Mg_zZn_{1-z}O$ ($0\leq z<1$) on said second conductivity type lower cladding layer,

etching said electric current constriction layer with an acidic or alkaline etchant to form an electric current injection region, and

growing a second conductivity type upper cladding layer made of a ZnO-based compound semiconductor.

57. An oxide compound semiconductor light emitting diode comprising:

an n-type layer made of an n-type ZnO-based compound semiconductor,

an i-layer made of a semiinsulating ZnO-based compound semiconductor, and

an electrically conductive layer disposed on a front surface of said i-layer.

58. An oxide compound semiconductor light emitting diode comprising:

an n-type layer made of an n-type ZnO-based compound semiconductor,

a doped layer in which a ZnO-based compound semiconductor layer is doped with at least one kind of element selected from the group consisting of Group IA, Group IB, and Group VB elements, and

an electrically conductive layer disposed on a front surface of said doped layer.

59. The semiconductor light emitting diode of claim 58, wherein said n-type layer is doped with a Group IIIB element.

60. A semiconductor light emitting device comprising:

a substrate, and

a light emitting layer forming portion disposed on said substrate and forming a light emitting layer by lamination of compound semiconductor layers having at least an n-type layer and a p-type layer, wherein said n-type layer is made of a ZnO-based compound semiconductor; and

wherein said p-type layer is made of a GaN-based compound semiconductor.

61. The semiconductor light emitting device of claim 60, wherein an active layer made of $Cd_xZn_{1-x}O$ ($0 \le x \le 0.5$) is disposed between said n-type layer and said p-type layer.

62. The semiconductor light emitting device of claim 61, wherein an n-type ZnO-based compound semiconductor layer made of a material having a larger band gap energy than said active layer is disposed between said active layer and said p-type layer.

63. A semiconductor light emitting device comprising:

an insulating substrate,

a light emitting layer forming portion formed of a p-type layer disposed on said insulating substrate and made of a GaN-based compound semiconductor and an n-type layer disposed on said p-type layer and made of a ZnO-based compound semiconductor,

an n-side electrode disposed on said n-type layer, and

a p-side electrode disposed on said p-type layer which is exposed by removal of a portion of said ZnO-based compound semiconductor layer through etching.

64. The semiconductor light emitting device of claim 63, wherein said light emitting layer forming portion has a semiconductor laser structure having a p-type layer made of a GaN-based compound semiconductor, an active layer made of a ZnO-based compound semiconductor having a smaller band gap energy than said p-type layer, and an n-type layer made of a ZnO-based compound semiconductor having a larger band gap energy than said active layer; and wherein said laminated ZnO-based compound semiconductor layers are removed by etching except for a region for injecting an

electric current into said active layer.

65. The semiconductor light emitting device of claim 64, wherein a buffer layer made of an n-type ZnO-based compound semiconductor having a larger band gap energy than said active layer is disposed between said p-type layer and said active layer.